Efficacy of Bilateral Transversus Abdominis Plane and Ilioinguinal-Iliohypogastric Nerve Block for Post-caesarean Delivery Pain relief under Spinal Anesthesia Seid Adem Adem, Zewditu Abdissa Denu[1§], Habtamu Getinet Kassahun, Demeke Yilikal Fentie

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Abstract

Background: Caesarean delivery can be associated with considerable postoperative pain. While the benefits of transversus abdominis plane (TAP) and ilioinguinal-iliohypogastric (II-IH) nerve blocks on pain after caesarean delivery via Pfannenstiel incision has been demonstrated, no enough investigations on the comparison of these blocks on pain after caesarean delivery have been conducted. We tested the hypothesis that both blocks reduce pain scores, decrease opioid consumption and prolong analgesic request time after caesarean delivery.

Method: Institutional based prospective observational cohort study was conducted to compare the analgesic efficacy of those blocks. We observed 102 post operative parturient 51 per each group. The outcome measure was severity of pain measured using numeric rating scale of 0-10 at 0, 4, 6, 8, 12 and 24 hours, total opioid consumption and first analgesic request time during the first 24 postoperative hrs.

Result: Twenty four hours after surgery NRS at rest was (0.90±0.80) vs (0.67±0.58) and at movement (1.2±1.07) vs (0.88±0.76) for the TAP and II-IH groups respectively. The difference between the groups over the whole observation period was not statistically significant (P>0.05).

Twenty-four hours after surgery, mean Tramadol consumption was (55.45±30.51) vs (37.27±27.09) mg in TAP and II-IH groups respectively (p= 0.009).

The mean first analgesic requirement time was also prolonged in the II-IH group in statistically significant fashion (p = 0.03).

Conclusion and recommendations: There was no statically significant difference between TAP and II-IH nerve blocks regarding post operative pain score in each time point both at rest and at movement but II-IH block significantly reduced total Tramadol consumption and prolong time to first analgesic request than TAP. We recommend II-IH nerve block for post cesarean delivery pain management via Pfannenstiel incision.

Key words: TAP, II IH, Gondar, Ethiopia

INTRODUCTION:

Pain management is crucially important in the postoperative period as it increases patient comfort and satisfaction (1). Caesarean delivery (CD) has been one of the most frequently performed major surgical interventions, and causes severe postoperative pain(2). Caesarean delivery and subsequent manipulation performed through Pfannenstiel incision is associated commonly with significant degree of pain in the postoperative period; 79% of women experience pain at the incision site that can last for up to 2 months (3).

Inadequate postoperative analgesia is one of the most common causes for poor patient satisfaction following caesarean delivery (3, 4).

Childbirth is an emotion-filled event and the mother wants to bond with her newborn as early as possible. Inadequate postoperative pain relief after CD can negatively impact ambulation, breastfeeding and even maternal bonding (2, 5).

Poor pain control in the post-operative period can lead to chronic pain syndromes and poor quality of life (2, 5).

The provision of effective postoperative analgesia is a key to facilitate early mobilization of the Mother, infant care, and prevention of postoperative morbidity. Improvement in postoperative analgesia may not only increase patient satisfaction but also diminish the duration of Hospital stay and reduce the risk of complications (6, 7).

The ideal form of postoperative analgesia is unknown, but many procedures are carried out under spinal anesthesia and currently opioids are commonly used for relief of postoperative pain after caesarean section, either by intrathecal administration prior to section or postoperative parenteral administration as a component of multimodal analgesia during the postoperative period (6, 8).

Even if opioids available to be via the spinal or systemic route, they had adverse effects such as nausea, vomiting, sedation, itching, and risk of delayed maternal respiratory depression, all of which reduce overall patient satisfaction (2,3, 8).

Additionally, these opioid-related adverse effects can produce other problems for new mothers such as delayed initiation of breastfeeding and impairment of mother/infant bonding (3).

An ideal method of pain relief after caesarean delivery should be cost effective, safe for the mother, require minimal monitoring and use drugs that are not secreted into breast milk. Moreover, the mother should not be sedated by the drugs that prevent her from moving freely and caring for the newborn.

Minor side effects, such as pruritus and shivering may interfere with care of the new born, leading to less maternal satisfaction. Drug availability, maternal health conditions, patient preferences and availability of medical expertise and trained support staff also play a role in choice of analgesic method.

Many scholars have been studying to find the safest and effective way of interventions for post operative CD pain management and they suggest methods like opioid or local anesthetic skin infiltration, epidural analgesia, intra thecal or intravenous opioids and abdominal field blocks like TAP and II-IH.

Among the above listed ways of pain management; intravenous opioids and regional nerve blocks are the main stay of treatment for post caesarean pain here in the study area.

Epidural analgesia, which is the Gold standard for control of labour pain and post operative pain is not commonly practiced in our set up due to lack of epidural kit.

Abdominal field blocks like TAP and II-IH are the main stay of treatment for post caesarean pain for both midline and Pfannenstiel incision because of opioid sparing effect, prolonged pain relief, technical simplicity and also it doesn't need repeated injection for optimal pain relief.(3,9)

TAP and II-IH nerve blocks are well known, easy to perform and currently these blocks are done in the study area for post CD pain management.

There is no enough data concerning the efficacy of TAP versus II-IH nerve block in the management of post operative pain in parturient undergoing caesarean section.

Most of the study that have been done to determine the efficacy of those blocks in post CD pain management are done in westerns countries but there is no published literature in Ethiopia.

The presence of racial, cultural, genetic and socio demographic difference in the perception of pain has been well documented (12, 13)**.**

There is also controversy regarding efficacy of the two blocks (14, 15) so, comparing the effectiveness of TAP block with that of II-IH nerve blocks will help us to have a best practice to the study area and knowing the efficacy of these blocks will allow anesthetists to choose the most effective one to manage post operative CD pain.

The aim of this study was to compare efficacy of TAP block and II IH blocs in controlling post caesarean section pain.

Methods:

An institutional based Observational cohort study was conducted from April 1- May 30, 2017 at Gondar University teaching Hospital after we secured ethical approval from university of Gondar ethical review board. The minimum sample size calculated for this study was 102. We used two population proportion formula. Study done elsewhere in developing countries show that incidence of post caesarean section pain is 87% and one study done in south Gondar shows that TAP reduces post caesarean section pain by 40%. We took the above information and power of the study to be 80% and Confidence level to be 95%. We included ASA I and ASAII patients. Finally we selected every consecutive parturient for whom the above mentioned nerve blocks were done and who are also volunteer to give consent to participate in the study till the required sample is achieved. Our primary outcome measure was severity of pain which was measured using Numeric rating scale. The secondary outcomes were total analgesic consumption and time for the first analgesic request. As to data collection procedure, two trained Anesthetists collect all the required information based on checklist prepared in English. Anesthesia was given as routine by assigned anesthetists who are not involved in this study. The type of nerve block to be used for every parturient was also decided by the assigned anesthetist.

Pain assessment was performed at 0hr, 4hr, 6hrs, 8hrs, 12hrs and 24hrs in the ward by blinded data collectors who were unaware of type of nerve block done. As well as total analgesic consumption within 24 hours was recorded.

Data were coded, entered, cleaned and crosschecked with SPSS version 20 statistical package. The data was tested for normality using the Shapiro-Wilk normality test. Normally distributed data were analyzed using Student's t-test.

All data other than categorical parameters were analyzed using student t-test.

The comparisons of categorical parameters were analyzed using chi-square test or Fisher's exact test as required and expressed in % and numbers. Data was presented as mean ± SD. P- value < 0.05 was considered statistically significant.

Results

A total of hundred and two clients were enrolled in the current study with response rate of 100%. The age of participants was 26.98 with standard deviation of 2.4 years. Assessment of ASA physical status showed that 78% % of the TAP groups and 76% of the II-IH were ASA I and 21.56% % of the TAP groups and 23.5% of the II-IH were ASA II [Table1].

Table1: Sociodemographic and other characteristics of study participants from April1-May30, 2017, Northwest Ethiopia. (n=51 TAP and n=51 II-IH).

Character	TAP (n= 51)	II-IH (n= 51)	p-value
Age (year)	27.27±2.88	26.69±1.79	0.219
Height (meter)	1.67 ± 0.04	1.65 ± 0.04	0.077
Weight (kg)	63.10 ± 7.69	64.88 ± 9.45	0.299
BMI (kg/m^2)	22.63 ± 2.01	23.29 ± 2.97	0.192
ASA I	40(78.51%)	39 (76.34%)	0.814
ASA II	11(21.56%)	12 (23.52 %)	
Parity			
Nulliparous	28(54.90%)	27(52.90%)	0.843
Multiparous	23(45.09%)	24(47.05%)	
Number of previous c/s			
0			
1	39(76.47%)	38(74.50%)	
2	11(21.56%)	9(17.64%)	0.529
3	1(1.96%)	3(5.88%)	
	0(0%)	1(1.96%)	
Level of sensory block			
T6-T4	7(13.72%)	8(15.68%)	0.780
T7-T10	44(86.27%)	43(84.31%)	
Duration of surgery (min)	45.29± 9.24	48.33 ±7.85	0.077

Post operative vital signs:

Post operative pulse rate and mean arterial blood pressure were comparable between the two groups. [Table 2 and 3]

Table 2: Postoperative pulse rate (beats per minute) in both groups who underwent caesarean delivery under spinal anesthesia in Gondar University Hospital from April1-May30, 2017, Northwest Ethiopia. (Data are mean ± SD)

Postoperative time	TAP group (n=51)	II-IH(n=51)	P-value
0 hour	77.29±4.11	75.20±7.91	0.96
4 hour	76.00±5.21	77.27±5.37	0.22
6 hour	76.02±5.98	77.35±2.99	0.15
8 hour	76.04±6.09	76.16±6.76	0.92
12 hour	76.41±3.00	76.53±2.36	0.82
24 hour	76.53± 3.85	75.16±3.63	0.06

Table 3: Postoperative mean arterial blood (mmHg) pressure in both groups who underwent caesarean delivery under spinal anesthesia in Gondar University Hospital from April1-May30, 2017, Northwest Ethiopia. (Data are mean ± SD)

Postoperative time	TAP group (n=51)	II-IH(n=51)	P-value
0 hour	78.43±5.45	76.42±5.59	0.06
4 hours	84.33±8.29	84.25±7.62	0.96
6 hours	85.05±6.18	85.01±6.47	0.97
8 hours	87.23±5.43	88.08±3.88	0.36
12 hours	84.77±6.66	86.22±6.02	0.25
24 hours	89.03±3.24	89.41±3.84	0.58

Postoperative pain scores using numerical rating scale

With regard to post operative pain score there was no difference between the two groups. We assessed pain score at rest, on coughing and on movement. The result shows no statistically significant difference between the two groups. [Table 4, 5].

Table 4 Postoperative NRS at rest over the first 24 postoperative hours among parturient who underwent caesarean delivery under spinal anesthesia in Gondar University Hospital from April1-May30, 2017, Northwest Ethiopia. (Data are mean ± SD)

Character	TAP group	II-IH group	P value
NRS at 0 hr	0.00	0.00	
NRS at 4 hrs	0.69±1.46	0 .41±1.00	0.27
NRS at 6 hrs	0.67±0.136	0.41±1.09	0.30
NRS at 8 hrs	0.65±1.18	0.35±0.79	0.14
NRS at 12 hrs	0.49±0.857	0.16±0.46	0.22
NRS at 24 hrs	0.90±0.80	0.67±0.58	0.95

Table 5 Postoperative NRS at movement or coughing in the postoperative 24 hours of parturient who underwent caesarean delivery under spinal anesthesia in Gondar University Hospital from April1-May30, 2017, Northwest Ethiopia. (Data are mean ± SD)

Character	TAP group	II-IH group	P value
NRS at 0 hr	**0.00**	**0.00**	
NRS at 4 hr	**1.63±2.12**	**0.96±1.52**	**0.07**
NRS at 6 hr	**1.84±1.88**	**1.24±1.53**	**0.07**
NRS at 8 hr	**1.39±1.53**	**1.00±1.09**	**0.14**
NRS at 12 hr	**1.39±1.49**	**0.92±1.197**	**0.08**
NRS at 24 hr	**1.20±1.07**	**0.88±0.76**	**0.09**

The mean Tramadol consumption among the TAP group was 52.45 with standard deviation of 30.5 and for the II IH group it was 37.25±27.09 mg and the mean first analgesic consumption time in this study was 10.71±7.67hr for TAP group and 14.09±8.20hr for II-IH, p value of 0.03 [table 6]

Table 6 Postoperative total opioid consumption and first analgesic request time over the first 24 postoperative hours of parturient that underwent caesarean delivery under spinal anesthesia in Gondar University Hospital from April1-May30, 2017, Northwest Ethiopia. (Data are mean ± SD)

Character	TAP group	II-IH group	P value
Total Tramadol consumption (mg)	**52.45±30.51**	**37.25±27.09**	**0.009**
First analgesic request time (hrs)	**10.71±7.67**	**14.09±8.20hr**	**0.03**

Discussion

We found that there was no statistically significant difference between TAP and II-IH block in numeric pain rating score both at rest and at movement for the first postoperative 24 hours but II-IH nerve block significantly reduced total Tramadol consumption and prolonged time for first analgesic request.

Studies comparing the two blocks are rare, so we compare our results separately for each block.

Our result was comparable with randomized controlled study done in Russia which showed that there was no stastically significant VAS (visual analogue score) difference between TAP and II-IH block after caesarean delivery via Pfannenstiel incision within 24 hours postoperatively (16).

A randomized comparative study done in New Zealand showed that II-IH nerve block reduced pain score significantly and post operative total Tramadol consumption (p= 0.03) than TAP after inguinal surgery (17). This is consistent with our result regarding Tramadol consumption.

A systematic review and meta-analysis done by Abdallah F in Canada demonstrated that TAP block enhance analgesia after caesarean delivery with detectable analgesic effect for the entire 24 hours (5).

Another review and meta analysis done by Mishriky BM conclude that TAP block improved postoperative analgesia and reduced pain score in women undergoing CD.(4) The above two are in agreement with our results.

A meta-analysis done by Champaneria R in 2016 showed that TAP block provide effective analgesia and reduced postoperative pain score after caesarean section (20). This is comparable to our result.

Our result is comparable with a randomized control trial study done in Saudi Arabia that showed NRS score was significantly lower in TAP group than the control up to 24 hrs both at rest and at movement after cesarean delivery via Pfannenstiel incision (20).

On the other hand, study done by M. Sakall et al. showed that II-IH nerve block decreased mean VAS score both at rest and at movement within 24 hours after CD (2). This is comparable with our finding.

Similarly, a study done in Jordan showed significant reduction in mean VAS score after II-IH nerve block when compared with placebo group in parturient underwent caesarean delivery under general anesthesia (21).

Our study demonstrated that II-IH reduced NRS pain score which is consistent with a study done by Bunting et al and Ganta and collegues, who analyzed mean VAS score and they found it to be less with the II-IH block as compared with the placebo group in parturient who underwent caesarean delivery (22). Study of Bell and colleagues also demonstrated that VAS score was reduced with II IH nerve block (3).

A study done in Turkey by Yucel and collegues showed that II-IH nerve block reduced VAS score for the first 24 hrs postoperatively than the control group. this is comparable with the current study (23).

In this study, the mean time for the first analgesic request was significantly prolonged in the II-IH group ($p= 0.03$). This is consistent with finding of previous comparative study done in Russia which showed that II-IH block prolonged the time to first analgesic requirement in a stastically significant fashion than TAP block following CD (16).

We found that the total amount of Tramadol consumption over the first 24 hours postoperative time was lower in the II-IH group than TAP group. This result is comparable with previous study (16). One study done in New Zealand was also in line with this study (17).

Our finding was also comparable with the studies conducted by Yucel E et al and Naghshineh et al, where they have found that postoperative analgesics consumption was significantly lower in the parturient who received II-IH block as compared with the control group (24).

Conclusion and recommendation

There was no stastically significant difference between TAP and II-IH nerve blocks regarding post operative pain score in each time point both at rest and at movement but II-IH block significantly reduced total Tramadol consumption and prolong time to first analgesic request than TAP.

We recommend II-IH nerve block for post cesarean delivery pain management via Pfannenstiel incision.

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Conflict of interest:

The authors declare no conflict of interest.

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